

Procedure and Equipment to Improve the Audio Quality in a Mobile Radio Network

Description

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B1 The invention concerns a procedure and equipment for improving audio quality in a
B2 mobile radio network.

The mobile radio network, e.g. the GSM-mobile radio network, is -- apart from a given range limitation and the used speech decoder -- sound (acoustic pattern) neutral.

The sound perceived by the mobile radio user is determined primarily by the mobile radio equipment being used; whereby, each manufacturer of the equipment "stamps" a different sound into his equipment. The currently available end device models have, to a great extent, large sound differences, which are perceived by the device users to be pleasant or less-than-pleasant.

It was determined by public opinion polls and surveys, for example, that the GSM1800 networks have a better sound than the GSM900 networks. Since this cannot be comprehended technically, it seems a likely supposition that this is because of the equipment's characteristics; that is, the better sound results not from the GSM1800 networks, but from the end devices used in this network.

A procedure for the user's individual improvement of sound quality with telephones is made known in EP-A-0 705 016. Before or during a discussion connection, the quality of sound can be improved in the current discussion connection, according to specifications or settings of the user by appropriate equipment in the communications network. For this, the user inputs the desired specifications or settings manually by his / her telephone, or his / her identity is determined automatically by the communications network so that based on the determined identity, whose specifications have been previously set, are recalled from a data base. The improvement of the sound quality, which is dependent on the end equipment or device, is not provided.

The invention is based on the fact that a tone control or equalizer is switched into a corresponding audio path in a communication connection, which influences the audio quality in the audio path, dependent on the type of equipment or devices used in the connection.

The task is solved by the characterizing features in Patent Claim 1.

The invention is based on the fact that a tone control is switched into a corresponding communication connection's audio path, which influences the audio quality in the audio path, dependent on the type of equipment or devices used in the connection, in that the sound is changed in the audio path.

Thus, the advantage is achieved that if there are eventual deficiencies of the audio quality of individual end device models, adjustments can be made on the network side, i.e. unnoticed by the user.

Now the network carrier, not the end device manufacturer, determines the sound characteristics of its network by determining the characteristics of the end devices' sound for each end device model.

This results in a direct quality leap for a network equipped with the invention. An end device with an inferior sound in a convention network gets a good sound quality in a network that uses the invention. The device user is then connected directly to the network quality, as shown above in the given opinion surveys.

Together with the end device, a tone control is configured into one of the audio paths so that it, for example, increases the level with a particularly muffled sounding device. In a further development of the invention, it is provided that the influence of the audio quality is different in the connection direction from the calling user to the called user and from the called user to the calling user.

The mobile switching center (MSC) determines by query of the mobile equipment identification (IMEI: International Mobile Equipment Identity) the device model. The query of the IMEI is usually always already completed with the authentication procedure between the mobile station and the mobile radio network, so that the mobile radio network accepts only devices or equipment with certified IMEI.

For each type of device, the corresponding sound parameters are stored and are at any time accessible in the data bank of the mobile switching center. The tone control of the 5 corresponding audio path is configured on the basis of the sound parameters stored in a certain type of equipment or device. The sound parameter can also be pre-held advantageously in the tone control itself.

The control signal for controlling the tone control is preferably supplied or prepared by 10 the mobile switching center, but can also be prepared or supplied by any other authority of the mobile radio network. It is also conceivable to follow the signaling by means of a separate trace-device on the different interfaces of the mobile radio systems and to steer the tone control with the data derived from it.

15 In a preferred embodiment of the invention, the tone control is located close to the Transcoder/Rate Adaption Unit (TRAU) and can preferably be equipped as a part of the code conversion. The code conversion TRAU converts from the base station control BSC PCM-A-Law in a 64 Kbytes(Kbits)/s-signal, which is further processed in the mobile switching center (MSC).

20 In accordance with another embodiment, the tone control, as a separate unit of the code conversion, is pre-switched or subsequently switched. The tone control can also be placed in the mobile switching center. It is just important that the tone control is switched, seen from the installation expense perspective, at a favorable position in the 25 audio path. A preferred position is, for example, there where there are a multiplicity of audio channels; also, for example in the TRAU or the MSC. The tone control includes, preferably, not only one tone control unit, but also a multiplicity of tone control units, which can be assigned to one audio path or audio channel.

In a further development of the invention, it is provided that the control signal for the tone control is not only a function of the mobile equipment identification (IMEI), but also
5 as a function of the user's individual features. The tone control could be adjusted differently as, e.g. for the private user, business user, guest user, hearing-impaired user, etc.

Finally, the possibility also exists of using the tone control for speech coding / encoding.

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In the following, the invention is more closely described on the basis of an embodiment example with reference to the drawing. Further characteristics, features and advantages of the invention are shown in the drawings.

10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400 410 420 430 440 450 460 470 480 490 500 510 520 530 540 550 560 570 580 590 600 610 620 630 640 650 660 670 680 690 700 710 720 730 740 750 760 770 780 790 800 810 820 830 840 850 860 870 880 890 900 910 920 930 940 950 960 970 980 990 1000

15 Figure 1 shows an example of a GSM-mobile radio network that basically involves equipment at a communication connection between the mobile radio user and the user of a public stationary network.

20 The mobile radio user would like to make a voice connection by means of a mobile radio end device to a user of a public stationary network (9) and enters over a base station (2) in the mobile radio network. The structure of the network is made in a known manner first by the base station (2), the base station control (3) to the mobile switching center (5), which takes over the further connection structure to the public stationary network (9). Between the base station control (3) and the mobile switching center (5), a code conversion (Transcoder/Rate Adaption Unit) is switched on, which can be placed, e.g.
25 within the mobile switching center (5).

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Now a tone control (7) is, according to the invention, switched into the audio path (10) of the connection, which is located preferably also in the area of the mobile switching center 5 (5). the tone control (7) is guided by the mobile switching center (5) over a control signal (8). The mobile switching center (5) determines the device model (1) used by the mobile radio user during the construction of the connection by query of the mobile equipment identification (IMEI). The query of the IMEI corresponds to the standards intended by GSM. Each marketable type of device and equipment has corresponding sound 10 parameters stored in a data bank (6) of the mobile switching center (5) and are accessible at any time. On the basis of the sound parameters stored to a certain type of device or equipment, the tone control (7) by the control signal (8) is configured by the connection of the corresponding audio paths. The sound parameters can also be advantageously pre-held in the tone control (7) itself. The tone control (7) now influences, corresponding to the specification, the sound in the audio path (10) and improves, corrects and / or evens out the sound.

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